preferably equivalent to the number of cavities **125**, one X-first conductor **142** and one Y-conductor **144** correspond to one cavity **125**. In this third variation, the location of a user touch is preferably determined by detecting a change in the measured capacitance value between one X-first conductor **142** and one Y-conductor **144**. Because each cavity **125** corresponds to a different pair of the X-conductors **142** and the Y-conductors **144**, the processor **160** is able to detect the location of the cavity **125** over which the user had applied force.

[0058] Alternatively, the array network of sensors **140** may include a plurality of sensors **140**, each coupled to a cavity **125**, that each output a signal specific to the cavity **125**. For example, in the capacitive sensor variation of the sensor **140**, the sensor **140** for a first cavity **125** may send a signal of $_{0.5}$ nF when a user input is detected and a signal of 1 nF when no user input is detected, the sensor **140** for a second cavity **125** may send a signal of 5 nF when a user input is detected and a signal of 10 nF when no user input is detected, the sensor **140** for a third cavity **125** may send a signal of 50 nF when a user input is detected and a signal of 100 nF when no user input is detected, and the sensor **140** for a fourth cavity **125** may send a signal of 500 nF when a user input is detected and a signal of 1000 nF when no user input is detected. Because each cavity **125** sends a different signal, the processor **160** is able to detect the location of the user input based upon the type and/or value of the signal that is received from the sensors **140**. The plurality of sensors **140** for the cavities **125** may also be arranged in a parallel relationship (such that the overall capacitive value for a plurality of capacitors in parallel equate to the sum of the individual capacitive values) to facilitate the processor **160** in sensing the location of the user input. For example, using the aforementioned example values for the signals from the sensors **140** of a first, second, third, and fourth cavities **140**, the processor **160** may receive a combined signal of $_{555.5}$ nF from the sensors **140** when a user input is detected from all of the first, second, third, and fourth cavities **125** and a signal of 1111 nF from the sensors **140** when no user input is detected from any of the first, second, third, and fourth cavities **125**. When a user input is detected from the third cavity **125** and not from the first, second, and fourth cavities **125**, then the combined signal to the processor **160** may be 1061 nF. Similarly, when a user input is detected from both the second and third cavities **125**, then the combined signal to the processor **160** may be 1056 nF. The processor **160** is then able to interpret the locations of the user input directly from the value of the signal that is received from a plurality of sensors **140** of the cavities **125**, simplifying electrical routing, mechanical components, and programming in the user interface system **100**. The sensors **140** may also be arranged in series or in any other suitable electrical arrangement.

[0059] The array arrangements described above also provide the advantage of utilizing multiple sensors **140** to more accurately locate the presence of a user input. User input onto a first expanded particular region **113** may affect the sensor **140** readings for a second expanded particular region **113**. By collectively analyzing readings from multiple sensors **140**, the particular region **113** upon which the user provides an input may be more accurately determined. For example, in the variation wherein the sensor **140** is a pressure sensor, the pressure sensed by other sensors **140** within the system may be increased when a user provides input at a first particular region **113**. By sensing the increase of pressure sensed by sensors **140** adjacent to a particular region **113**, the location of the user input may be more accurately determined. Additionally, the array arrangements described above allows for multiple inputs provided at a single time to be detected by the system.

[0060] The sensors **140** are preferably located within the cavities **125**, but may alternatively be located adjacent to the cavities **125** or both within and adjacent to the cavities **125**. By placing sensors **140** both within and adjacent to the cavities **125**, user inputs provided to locations other than the particular regions **113** may also be detected, expanding the range of input types and query types for the device. Sensors **140** placed adjacent to the cavities **125** may also be used to more accurately locate the particular region **113** upon which the user provided the input.

[0061] The sensor **140**, cavity **140**, and second cavity **140** may are preferably in arranged in one of the variations described above, but may also be any combination of the variations described above. However, any other suitable arrangement or method of controlling the cavities **125** may be used.

6. Power Source

[0062] The user interface system **100** of the preferred embodiments may also include either a power source or a power harnessing device, which both function to power the displacement device **130** (and possibly other elements of the user interface system, such as the sensor **140** and/or the display **150**). The power source is preferably a conventional battery, but may be any suitable device or method that provides power to the displacement device **130**. The power-harnessing device, which is preferably integrated into the hinge of a flip phone or laptop, functions to harness a portion of the energy involved in the normal use of the electronic device (such as the physical energy provided by the user in the opening of a flip phone or the screen on a laptop). The power-harnessing device may alternatively be integrated in a separate mechanical input device (such as a button on the side of a mobile phone, or a "self-winding" device found in automatic watches) or any other suitable device or method to harness a portion of the energy involved in the normal use of the electronic device.

[0063] As a person skilled in the art will recognize from the previous detailed description and from the figures and claims, modifications and changes can be made to the preferred embodiments of the invention without departing from the scope of this invention defined in the following claims.

We claim:

1. A user interface system, comprising:

a sheet that defines a surface on one side and at least partially defines a cavity on an opposite side;

a volume of a fluid contained within the cavity;

a displacement device that modifies the volume of the fluid to expand the cavity, thereby outwardly deforming a particular region of the surface; and

a sensor that detects a force applied by a user that inwardly deforms the particular region of the surface.

2. The system of claim **1**, wherein the sensor is a capacitive sensor that detects a change in the electromagnetic field generated by the capacitive sensor and caused by the presence of an object.

3. The system of claim **2**, wherein the object is a finger over the particular region of the surface.